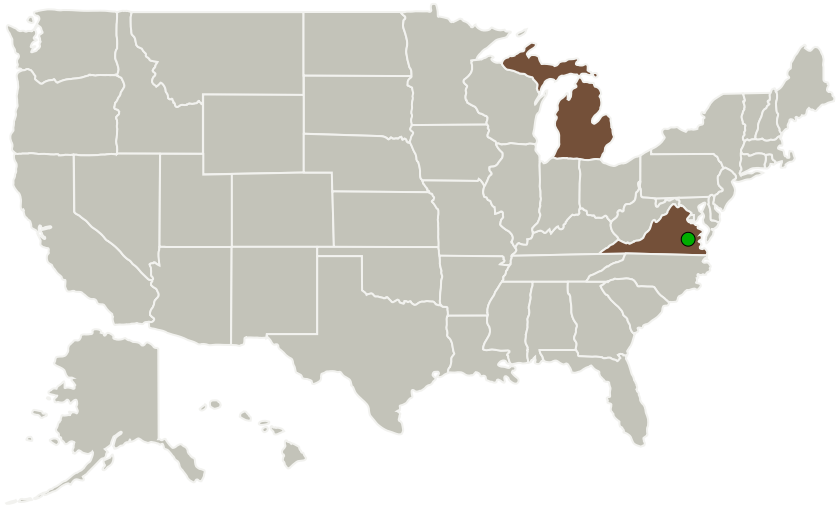
Miniaturized Time Domain Terahertz Non Destructive Evaluation for In-Orbit Inspection of Inflatable Habitats and Thermal Protection Systems, Phase I

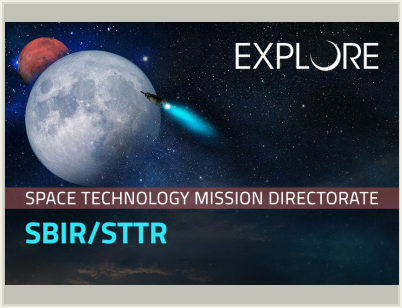
Completed Technology Project (2011 - 2011)

Project Introduction

Picometrix's time-domain terahertz (TD-THz) non-destructive evaluation (NDE) technology could be used to inspect space flight structures such as inflatable space habitats, thermal protection systems (TUFI-type tiles, SOFI TPS), for voids, disbonds, and damage such as tearing and micron-meteorite impact. In this Phase I SBIR project, we propose to test the feasibility of three key technological changes which could substantially reduce the volume, mass, and power requirement of the TD-THz instrumentation, making it more suitable for use by an operator in space. The current instrumentation paradigm is that a multi-purpose TD-THz control unit is used to provide common drive, data acquisition, and analysis functionality to interchangeable sensors and imaging which connect to the control unit with a fiber-optic/electrical umbilical. However, the current COTS control unit is substantially larger and heavier than would be desirable for a space-flight capable unit. The proposed developments would enable a control unit for a hand held NDE imaging tool, sufficiently robust for spaceflight, no larger than a small shoebox. It should be possible to reduce the size of the control unit to approximately one sixth of the current values to, for example, 14 in. X 8 in. X 4 in and 10 pounds.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2011 - 2011)

Organizations Performing Work	Role	Type	Location
Picometrix, LLC	Lead Organization	Industry	Ann Arbor, Michigan
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Michigan	Virginia

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140230)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Picometrix, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Zimdars

Co-Investigator:

David Zimdars

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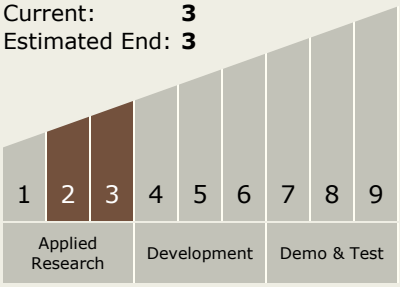
Completed Technology Project (2011 - 2011)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System